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Title:

Slope-Based Stochastic Resonance

Abstract:

Many neurons fire repetitively in response to steady input. Phasic neurons, however, fire only at the onset of a steady input. For time-varying inputs, phasic neurons are band-pass filters or slope detectors. We have shown that noise enables a phasic model to encode transient features of slow inputs with slopes that are below their deterministic threshold levels. This stochastic-resonance (SR) like effect differs significantly from the classical SR behavior. Instead of being most sensitive to the peak of a subthreshold signal, as is typical in a classical SR system, phasic models are most sensitive to the signal's rising and falling phases.